NEBRASKA PRACTICE DOCUMENTATION REQUIREMENTS

GRASSED WATERWAY (412)

I. GENERAL

Minimum documentation requirements for this practice are outlined below. Documentation for associated practices or system components shall follow the appropriate practice documentation requirements. Additional documentation requirements can be found in the General Documentation Requirements section of the Nebraska Practice Documentation Requirements Manual.

A. References
1. National Engineering Manual (NEM)
2. Nebraska Field Office Technical Guide (FOTG)
3. National Engineering Handbook (NEH), Part 650, Chapters 2, 3, and 7
4. Minimum NRCS Waterway Design by County
5. SCS-TP-61, “Handbook of Channel Design for Soil and Water Conservation”
6. Agricultural Handbook 667, Stability Design of Grassed-lined Open Channels (ARS)
7. Conservation plan for the unit
8. Computer software – NRCS Ohio Engineering programs, others
9. Local supplemental criteria

II. RESOURCE INVENTORY AND SURVEYS

A. Design Investigations
1. Number and reach
2. Drainage area (ac)
3. Channel slope (%)
4. Runoff Curve Number
5. Allowable velocity (ft/sec) based on soil type
6. Location of underground utilities
7. Locations of waterway outlets considering erosion, sedimentation, and drainage laws

B. Design Surveys
1. Design surveys may be combined with layout surveys, dependent on the judgement and experience of the responsible designer.
2. Minimum Waterway Designs
   a. Surveys for channel grade are not required.
   b. One or more representative cross-sections per reach as needed to estimate volume.
3. Waterway Designed Individually
   a. Surveys of waterway channel grade are required.
   b. Check channel grade at a <u>minimum</u> of one location per reach.
   c. Benchmarks description, location, and elevation or rod readings.

4. Field survey notes will conform to NEM Part 540 and follow standard field note documentation as illustrated in Technical Release 62 (TR-62) and/or Nebraska Standard Format for Engineering Notes Transmittal Sheets No. 3. Survey notes will be prepared such that they exhibit legible, logical, clear and concise data.

C. Environmental Inventory
   1. NEPA inventory of resources -- form NE-CPA-52 must be completed by NRCS during planning
   2. Wetland effects, if applicable
   3. Archeological/Historical/Cultural Resources
      a. Complete all continuing environmental requirements stemming from planning as expressed in the General Documentation Requirements section of the Nebraska Practice Documentation Requirements Manual.

III. DESIGN

A. Design data -- record on form NE-ENG-21 and provide printout from software (OHIO Engineering Programs)
   1. Hydrologic data -- peak design flows for each reach
   2. Hydraulic determinations -- safe velocities for each reach based on soils and/or vegetal retardance
   3. Required dimensions and capacity for each reach
   4. Description of temporary or permanent erosion control structures to be installed
   5. Quantity and cost estimates
   6. Seeding requirements and area to be seeded
   7. Legal description
   8. Initials/signatures and dates by the person(s) responsible for the design, approval, and checking of the design.

B. Permits and Approvals
   1. 404 permit (if applicable) -- document if individual permit was obtained, nationwide permit applies, or if practice is exempt.
   2. County road ditch discharge permits if applicable.

IV. PLANS AND SPECIFICATIONS

A. Plans
   1. Use form NE-ENG-21, 21A, or appropriate “D” or “B” sized sheets.
   2. Plan view -- may be superimposed on location map. Show stationing and identify reaches. Include map orientation.
   3. Profile -- centerline of waterway. Show original ground superimposed on design, grade, stationing, reaches, etc. Centerline profiles are required on waterways as needed. Determination is based on judgment of person with Job Approval Authority.
   4. Cross-sections -- plot cross-sections for each reach.

5. Construction notes -- add notes to clarify a component and furnish directions for installations to supplement standard specifications as needed.
    a. Construction plans shall include a statement requiring the contractor to notify the Nebraska One-Call System (Diggers Hotline) regarding utilities on the construction site. See the General Documentation Requirements section of the Nebraska Practice Documentation Requirements Manual for the recommended statement.
    b. Add notes as necessary to identify avoidance and, if needed, protection areas and boundaries associated with cultural resources, threatened or endangered species, or other resources needing temporary protection during installation.
6. Table of quantities.
7. NRCS Engineering Job Class from NE-ENG-14.
8. Location map with legal description.

B. Specifications
1. Nebraska FOTG Conservation Practice specifications, component specifications from NEH Part 650, Engineering Field Handbook Appendix 1, or equivalent, modified as needed. Additional specifications may be written to provide full material and installation instructions.

C. O&M Plans
1. As specified in Waterway (412) Standard in Nebraska FOTG.

D. Plans, Specifications, O&M Plans Delivery
1. Case folder
2. Transmittal letter copy

V. LAYOUT

A. Layout Surveys
1. Use field notebook, forms, etc.
2. Minimum Waterway Design
    a. Identify alignment of waterway for construction purposes.
3. Individual Waterway Design
    a. Record in field notebook or on forms NE-ENG-21 and 21A.
    b. Reference stakes or slope stakes at each reach to control alignment and grade as designed.
    c. Set stations on grade or land slope changes and at an interval based on the judgment of the technician with Job Approval Authority. Recommended maximum interval – 500 feet.

B. Quantity Computations
1. Minimum Waterway Design
    a. Representative cross-sections for pre-construction quantities.
2. Individual Waterway Design
    a. Obtain sufficient cross-sections per design reach to calculate volumes by average end area method. Final quantities are based on staked cross-sections or approved changes.

VI. COMPLIANCE CHECKING

A. Record in field notes or on NE-ENG-21 or 21A.
   1. Length, width, depth, and side slopes. Individual design waterways require a minimum of one cross-section per design reach.
   2. Statement on temporary or permanent erosion control measures installed.
   3. Status of seeding.
   4. Construction inspection report -- form NE-ENG-49.
   5. Statement of compliance - statement that construction is completed according to plans and specifications, signed and dated by the person certifying completion.

B. "As Built" Plans
   1. Refer to NEM, 512.51 and 512.52
   2. "As Built" plans are a record of constructed facilities. "As Built" plans are required when a significant change in design occurs during construction or when the job is designated Class V or higher. Changes are superimposed in a different color (usually red), or differentiated in some other manner (such as a drawing a box around the as-built value) on the official file copy and show:
      a. Significant[1] design changes.
      b. Significant[1] changes in linear measurement.
      c. Final quantities -- may be based on layout stake notes, if no changes were approved and work meets planned lines and grades.
      d. Identify as "As Built" on plans.

[1] Determination of "significant" is a matter of judgment by the technician. As a general rule, changes that exceed normal measuring error allowances, normal construction tolerances, and methods of mathematical computation, should be considered as significant.